

IN THE CLAIMS:

1. (Previously Presented) An ink jet printing apparatus comprising:

an ink jet head including an ink ejecting portion and an ejection-energy generating portion operable to eject droplets of an ink from said ink ejecting portion;

an ink cartridge for supplying said ink jet head with the ink;

a purging device operable to discharge the ink from said ink ejecting portion, without an operation of said ejection-energy generating portion, for thereby performing a purging operation to improve an ink ejecting state of said ink jet head; and

a controller operable to control said purging device for performing said purging operation, and to control said ejection-energy generating portion for performing a flushing operation to discharge the ink from said ink ejecting portion to improve the ink ejecting state of said ink jet head,

and wherein said controller includes a flushing control portion operable to control said ejection-energy generating portion in a first mode in which ink ejecting actions in said flushing operation are performed in a plurality of intermittent cycles, with a non-ejection pause which is inserted between two successive ones of said intermittent cycles and which has a time duration longer than a period of each of the ink ejecting actions, and a second mode in which said ink ejecting actions are performed continuously in one cycle without said non-ejection pause,

wherein said flushing control portion further includes a time measuring portion operable to measure a time which has passed after installation of said ink cartridge of said ink jet head, said flushing control portion being operable in said first mode after the time measured by said time measuring portion has reached a predetermined threshold, and in said second mode before said time has reached said predetermined threshold.

2. (Original) The ink jet printing apparatus according to claim 1, wherein said time duration of said non-ejection pause is long enough to permit air bubbles in the ink in said ink jet head to be substantially dissolved in the ink.

3. (Original) The ink jet printing apparatus according to claim 2, wherein said flushing control portion controls said ejection-energy generating portion such that the ink ejecting actions in each of said plurality of intermittent cycles are effected at a frequency of 4-10 kHz.
4. (Original) The ink jet printing apparatus according to claim 3, wherein said time duration of said non-ejection pause is about one second.
5. (Original) The ink jet printing apparatus according to claim 2, wherein said time duration of said non-ejection pause is about one second.
6. (Original) The ink jet printing apparatus according to claim 1, wherein said flushing control portion activates said ejection-energy generating portion to perform said flushing operation after termination of said purging operation by said purging device.
7. (Original) The ink jet printing apparatus according to claim 1, wherein each of said plurality of intermittent cycles includes the ink ejecting actions performed for a length of time during which air bubbles in the ink in said ink jet head do not grow to sizes so large as to disturb a normal ink ejecting operation of said ink jet head.
8. (Original) The ink jet printing apparatus according to claim 1, wherein said flushing control portion includes a timer operable to measure said time duration of said non-ejection pause.
9. (Original) The ink jet printing apparatus according to claim 1, wherein said flushing control portion is operable to control said ejection-energy generating portion such that each of said plurality of intermittent cycles includes a predetermined number of the ink ejecting actions.
10. (Original) The ink jet printing apparatus according to claim 1, wherein said flushing control portion is operable to control said ejection-energy generating portion such that the ink ejecting actions in each of said plurality of intermittent cycles are performed for a predetermined time duration.

11. (Cancelled)

12. (Previously Presented) An ink jet printing apparatus comprising:

a head unit having a plurality of ink jet heads each including an ink ejecting portion and an ejection-energy generating portion operable to eject droplets of an ink from said ink ejecting portion;

a plurality of ink cartridges for supplying said plurality of ink jet heads with the ink;

a purging device operable to discharge the ink from said ink ejecting portions of two adjacent ones of said plurality ink jet heads, without operations of said ejection-energy generating portions of said two adjacent ink jet heads, for thereby performing a purging operation to improve ink ejecting states of said two adjacent ink jet heads; and

a controller operable to control said purging device for performing said purging operation, and to control said ejection-energy generating portion for performing a flushing operation to discharge the ink from said ink ejecting portion of each of said two adjacent ink jet heads to improve the ink ejecting states of said two adjacent ink jet heads,

and wherein said controller includes a flushing control portion operable to control said ejection-energy generating portion of said each of the two adjacent ink jet heads in a first mode in which ink ejecting actions in said flushing operation are performed in a plurality of intermittent cycles, with a non-ejection pause which is inserted between two successive ones of said intermittent cycles and which has a time duration longer than a period of each of the ink ejecting actions, and in a second mode in which said ink ejecting actions are performed continuously in one cycle without said non-ejection pause,

wherein said flushing control portion further includes a time measuring portion operable to measure a time which has passed after installation of each of said plurality of ink cartridges on the corresponding ink jet head, said flushing control portion being operable in said first mode after the time measured by said time measuring portion has reached a predetermined threshold, and in said second mode before said time has reached said predetermined threshold.

13. (Original) The ink jet printing apparatus according to claim 12, wherein said purging device includes a suction cap arranged for a pressure-tight contact with the ink ejecting portions of said two adjacent ink jet heads.

14. (Cancelled)

15. (Previously Presented) An ink jet printing apparatus comprising:

an ink jet head of piezoelectric type having a plurality of ink chambers, a plurality of ejection nozzles, and a piezoelectric actuator operable to pressurize an ink in selected ones of said plurality of ink chambers, for ejecting droplets of the ink from the corresponding ejection nozzles;

an ink cartridge for supplying said ink jet head with the ink;

a purging device operable to discharge the ink from said plurality of ejection nozzles, without an operation of said piezoelectric actuator, for thereby performing a purging operation to improve an ink ejecting state of said ink jet head; and

a controller operable to control said purging device for performing said purging operation, and to control said piezoelectric actuator for performing a flushing operation to discharge the ink from said plurality of ejection nozzles to improve the ink ejecting state of said ink jet head,

and wherein said controller includes a flushing control portion operable to control said piezoelectric actuator in a first mode in which ink ejecting actions in said flushing operation are performed in a plurality of intermittent cycles, with a non-ejection pause which is inserted between two successive ones of said intermittent cycles and which has a time duration longer than a period of each of the ink ejecting actions, and a second mode in which said ink ejecting actions are performed in one cycle without a non-ejection pause,

wherein said flushing control portion further includes a time measuring portion operable to measure a time which has passed after installation of said ink cartridge on said ink jet head, said flushing control portion being operable in said first mode after the time measured by said time measuring portion has reached a predetermined threshold, and in said second mode before said time has reached said predetermined threshold.

16. (Cancelled)

17. (Cancelled)

18. (Previously Presented) An ink jet printing apparatus comprising:

a head unit having a plurality of ink jet heads of piezoelectric type each having a plurality of ink chambers, a plurality of ejection nozzles, and a piezoelectric actuator operable to pressurize an ink in selected ones of said plurality of ink chambers, for ejecting droplets of the ink from said plurality of ejection nozzles;

a plurality of ink cartridges for supplying said plurality of ink jet heads with the ink;

a purging device operable to discharge the ink from said plurality of ejection nozzles of two adjacent ones of said plurality ink jet heads, without operations of said piezoelectric actuators of said two adjacent ink jet heads, for thereby performing a purging operation to improve ink ejecting states of said two adjacent ink jet heads; and

a controller operable to control said purging device for performing said purging operation, and to control said piezoelectric actuator for performing a flushing operation to discharge the ink from said plurality of ejection nozzles of each of said two adjacent ink jet heads to improve the ink ejecting states of said two adjacent ink jet heads,

and wherein said controller includes a flushing control portion operable to control said piezoelectric actuator of said each of the two adjacent ink jet heads in a first mode in which ink ejecting actions in said flushing operation are performed in a plurality of intermittent cycles, with a non-ejection pause which is inserted between two successive ones of said intermittent cycles and which has a time duration longer than a period of each of the ink ejecting actions, and in a second mode in which said ink ejecting actions are performed in one cycle without said non-ejection pause

wherein said flushing control portion further includes a time measuring portion operable to measure a time which has passed after installation of each of said plurality of ink cartridges on the corresponding ink jet head, said flushing control portion being operable in said first mode after the time measured by said time measuring portion has reached a predetermined threshold, and in said second mode before said time has reached said predetermined threshold.

19. (Cancelled)

20. (Cancelled)